

Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application:

1. (Currently Amended) A system for issuing an authentication certificate used in personal authentication, comprising:

reaction means for reacting a DNA array in which a plurality of DNA probes corresponding to plural kinds of genes are arranged in a predetermined order, with a gene obtained from a given person; and

issuing means for issuing an authentication certificate for certifying the person ~~by using a hybridization pattern formed on a reacted DNA array obtained by said reaction~~ means ; and

controlling means for executing a process comprising the steps of:

(i) making said reaction means react the DNA array with a gene obtained from the given person to form a hybridization pattern; and

(ii) making said issuing means issue an authentication certificate by using the hybridization pattern.

2. (Original) The system according to claim 1, wherein said issuing means issues the authentication certificate by attaching the reacted DNA array obtained by said reaction means to the base.

3. (Original) The system according to claim 1, wherein said issuing means issues the authentication certificate on which layout information that expresses positions of hybridized probes using numerical values is recorded.
4. (Original) The system according to claim 3, wherein the layout information is magnetically recorded.
5. (Original) The system according to claim 3, wherein the layout information is recorded in the form of digital information.
6. (Original) The system according to claim 3, wherein the DNA array is formed by arranging a plurality of probes in row and column directions, and the layout information expresses the positions of the hybridized probes on the DNA array using row and column addresses.
7. (Original) The system according to claim 1, wherein DNA probes of the DNA array comprise gene probes associated with major histocompatibility complex antigens.
8. (Original) The system according to claim 1, wherein DNA probes of the DNA array comprise gene probes associated with major histocompatibility complex antigens and single nucleotide polymorphisms.
9. (Original) The system according to claim 1, further comprising extraction means for extracting DNA from a blood sample, and providing the DNA to said reaction means.
10. (Original) The system according to claim 1, wherein a substrate on which the base and the DNA array are integrally formed is used.

11. (Currently Amended) A method for issuing an authentication certificate used in personal authentication, comprising the steps of:

(i) ~~the reaction step~~ of reacting a DNA array in which a plurality of DNA probes corresponding to plural kinds of genes are arranged in a predetermined order, with a gene obtained from a given person to form a hybridization pattern; and

(ii) ~~the issuing step~~ of issuing an authentication certificate for certifying the person by using a the hybridization pattern ~~formed on a reacted DNA array obtained in the reaction step.~~

12. (Currently Amended) The method according to claim 11, wherein the step (ii) comprises a sub-step of issuing ~~means includes the step of issuing the authentication certificate by attaching the reacted DNA array obtained in the reaction step (ii) to the base to form the authentication certificate.~~

13. (Currently Amended) The method according to claim 11, wherein the issuing step (ii) comprises ~~includes the step a sub-step of recording of issuing the authentication certificate on which~~ layout information that expresses positions of hybridized probes using numerical values to a base is recorded.

14. (Original) The method according to claim 13, wherein the layout information is magnetically recorded.

15. (Original) The method according to claim 13, wherein the layout information is recorded in the form of digital information.

16. (Original) The method according to claim 13, wherein the DNA array is formed by arranging a plurality of probes in row and column directions, and

the layout information expresses the positions of the hybridized probes on the DNA array using row and column addresses.

17. (Original) The method according to claim 11, wherein DNA probes of the DNA array comprise gene probes associated with major histocompatibility complex antigens.

18. (Original) The method according to claim 11, wherein DNA probes of the DNA array comprise gene probes associated with major histocompatibility complex antigens and single nucleotide polymorphisms.

19. (Original) The method according to claim 11, further comprising the extraction step of extracting DNA from a blood sample, and providing the DNA to the reaction step.

20. (Original) The method according to claim 11, wherein a substrate on which the base and the DNA array are integrally formed is used.

21. (Currently Amended) An apparatus for issuing an authentication certificate used in personal authentication, comprising:

reaction means for reacting a DNA array in which a plurality of DNA probes corresponding to plural kinds of genes are arranged in a predetermined order, with a gene obtained from a given person to form a hybridization pattern; and

issuing means for issuing an authentication certificate for certifying the person by using a the hybridization pattern ~~formed on a reacted DNA array obtained by said reaction means.~~

22. (Original) The apparatus according to claim 21, wherein said issuing means issues the authentication certificate by attaching the reacted DNA array obtained by said reaction means to the base.

23. (Original) The apparatus according to claim 21, wherein said issuing means issues the authentication certificate on which layout information that expresses positions of hybridized probes using numerical values is recorded.

24. (Original) The apparatus according to claim 21, further comprising extraction means for extracting DNA from a blood sample, and providing the DNA to said reaction means.

25. (Currently Amended) An authentication system for personal authentication which is used together with an authentication certificate on which there is layout information representing a hybridization pattern formed on a DNA array reacted with a gene obtained from a given person, the DNA array carrying a plurality of DNA probes corresponding to plural kinds of genes in a predetermined order, the system comprising:

storage means for storing registration information which includes the layout information ~~that represents a hybridization pattern formed on a reacted DNA array obtained by reacting a DNA array in which a plurality of DNA probes corresponding to plural kinds of genes are arranged in a predetermined order, with a gene obtained from a given person;~~

acquisition means for acquiring the layout information from ~~an~~ the authentication certificate; and

controlling means for executing a process comprising the steps of:

(i) ~~generation means for generating authentication information on the basis of the layout information acquired by said acquisition means; and~~

(ii) ~~authentication means for making authentication by collating the authentication information generated by said generation means with the registration information as a reference stored in said storage means, and making authentication.~~

26. (Original) The system according to claim 25, wherein the registration information and authentication information contain the layout information and type information used to specify a probe layout on the DNA array.

27. (Original) The system according to claim 25, wherein the layout information includes data that represent positions of the hybridized probes on the DNA array by coordinate values.

28. (Original) The system according to claim 25, wherein the authentication certificate includes a reacted DNA array on which a reaction pattern is formed upon reaction with a DNA of a given person, and

said acquisition means comprises a scanner for reading the hybridized pattern of the reacted DNA array as an image, and conversion means for detecting probes after reaction from the read image, and converting the detected probes into the layout information.

29. (Original) The system according to claim 25, wherein the authentication certificate records the layout information as digital information, and

said acquisition means acquires the layout information by reading the digital information.

30. (Original) The system according to claim 25, wherein the authentication certificate records the layout information as magnetic information, and

said acquisition means acquires the layout information by reading the magnetic information.

31. (Original) The system according to claim 25, further comprising registration means for storing the authentication information generated by said generation means in said storage means as the registration information.

32. (Original) The system according to claim 25, wherein the DNA array comprises gene probes associated with major histocompatibility complex antigens.

33. (Original) The system according to claim 25, wherein the DNA array comprises gene probes associated with major histocompatibility complex antigens and single nucleotide polymorphisms.

34. (Original) The system according to claim 25, wherein the DNA array is formed by arranging a plurality of probes in row and column directions, and the layout information expresses the positions of the hybridized probes on the DNA array using row and column addresses.

35. (Original) The system according to claim 25, wherein the authentication information and registration information contain person specifying information for specifying a given person, and

said authentication means makes authentication by searching said storage means for registration information which contains the same person specifying information as

the person specifying information contained in the authentication information generated by said generation means, and collating the layout information of the generated authentication information and the registration information found by search.

36. (Original) The system according to claim 25, wherein an apparatus having said acquisition means and said generation means, and an apparatus having said storage means and said authentication means are connected via the Internet, and the authentication information is sent via the Internet.

37. (Currently Amended) An apparatus for sending an authentication request to an external apparatus, the apparatus being used with an authentication certificate on which there is layout information representing a hybridization pattern formed on a reacted DNA array obtained by reacting a DNA array in which a plurality of DNA probes corresponding to plural kinds of genes are arranged in a predetermined order, with a gene obtained from a given person, the apparatus comprising:

acquisition means for acquiring layout information ~~that represents a hybridization pattern formed on a reacted DNA array obtained by reacting a DNA array in which a plurality of DNA probes corresponding to plural kinds of genes are arranged in a predetermined order, with a gene obtained from a given person, by reading of an~~ authentication certificate; and

controlling means for executing a process comprising the steps of:

(i) generation means for generating authentication information on the basis of the layout information acquired by said acquisition means;

(ii) registration request means for sending the authentication information generated in the step (1) to the external apparatus, and requesting to request user registration;
and

(iii) authentication request means for sending the authentication information to the external apparatus, and requesting to request authentication.

38. (Currently Amended) An apparatus for making user authentication in response to an authentication request from an external apparatus, comprising:

reception storage means for receiving storing authentication information which includes layout information that represents a hybridization pattern formed on a reacted DNA array obtained by reacting a DNA array in which a plurality of DNA probes corresponding to plural kinds of genes are arranged in a predetermined order, with a gene obtained from a given person, and instruction information indicating a registration request or authentication request; and

controlling means for executing a process comprising the steps of:

(i) receiving an authentication information together with instruction information indicating a registration request or a authentication request;

(ii) registration means for, when the instruction information indicates the registration request, making user registration on the basis of registering the authentication information, when the instruction information received in the step (i) is a registration request, to said storage means the authentication information received by said reception means; and

(iii) authentication means for, when the instruction information indicates the authentication request, making user authentication, when the instruction information received

in the step (i) indicates the authentication request, by collating the authentication information received in the step (i) with the authentication information registered to the storage means in the step (ii) on the basis of the authentication information received by said reception means, and registration contents registered by said registration means .

39. (Currently Amended) An authentication method for personal authentication comprising the steps of:

(i) using providing a storage means for storing which stores registration information ~~which includes~~ including layout information ~~that represents~~ representing a hybridization pattern formed on a reacted DNA array obtained by reacting a DNA array in which a plurality of DNA probes corresponding to plural kinds of genes are arranged in a predetermined order, with a gene obtained from a given person; ~~comprising:~~

(ii) the acquisition step of acquiring the layout information from an authentication certificate;

(iii) the generation step of generating authentication information on the basis of the layout information acquired in the acquisition step step (ii); and

(iv) the authentication step of making authentication by collating the authentication information generated in the generation step (iii) with the registration information stored in said storage means, and making authentication.

40. (Original) The method according to claim 39, wherein the registration information and authentication information contain the layout information and type information used to specify a probe layout on the DNA array.

41. (Original) The method according to claim 39, wherein the layout information includes data that represent positions of the hybridized probes on the DNA array by coordinate values.

42. (Original) The method according to claim 39, wherein the authentication certificate includes a reacted DNA array on which a reaction pattern is formed upon reaction with a DNA of a given person, and

the acquisition step comprises the conversion step of detecting probes after reaction from an image read by a scanner for reading the reaction pattern of the reacted DNA array as an image, and converting the detected probes into the layout information.

43. (Original) The method according to claim 39, wherein the authentication certificate records the layout information as digital information, and

the acquisition step includes the step of acquiring the layout information by reading the digital information.

44. (Original) The method according to claim 39, wherein the authentication certificate records the layout information as magnetic information, and

the acquisition step includes the step of acquiring the layout information by reading the magnetic information.

45. (Original) The method according to claim 39, further comprising the registration step of storing the authentication information generated in the generation step in said storage means as the registration information.

46. (Original) The method according to claim 39, wherein the DNA array comprises gene probes associated with major histocompatibility complex antigens.

47. (Original) The method according to claim 39, wherein the DNA array comprises gene probes associated with major histocompatibility complex antigens and single nucleotide polymorphisms.

48. (Original) The method according to claim 39, wherein the DNA array is formed by arranging a plurality of probes in row and column directions, and

the layout information expresses the positions of the hybridized probes on the DNA array using row and column addresses.

49. (Original) The method according to claim 39, wherein the authentication information and registration information contain person specifying information for specifying given person, and

the authentication step includes the step of making authentication by searching said storage means for registration information which contains the same person specifying information as the person specifying information contained in the authentication information generated in the generation step, and collating the layout information of the generated authentication information and the registration information found by search.

50. (Original) The method according to claim 39, wherein an apparatus having the acquisition step and the generation step, and an apparatus having said storage means and the authentication step are connected via the Internet, and the authentication is sent via the Internet.

51. (Previously Presented) A method for sending an authentication request to an external apparatus, comprising:

the acquisition step of acquiring layout information that represents a hybridization pattern formed on a reacted DNA array obtained by reacting a DNA array in which a plurality of DNA probes corresponding to plural kinds of genes are arranged in a predetermined order, with a gene obtained from a given person, by reading an authentication certificate;

the generation step of generating authentication information on the basis of the layout information acquired in the acquisition step;

the registration request step of sending the authentication information to the external apparatus to request user registration; and

the authentication request step of sending the authentication information to the external apparatus to request authentication.

52. (Previously Presented) A method for making user authentication in response to an authentication request from an external apparatus, comprising:

the reception step of receiving authentication information which includes layout information that represents a hybridization pattern formed on a reacted DNA array obtained by reacting a DNA array in which a plurality of DNA probes corresponding to plural kinds of genes are arranged in a predetermined order, with a gene obtained from a given person, and instruction information indicating a registration request or authentication request;

the registration step of making, when the instruction information indicates the registration request, user registration on the basis of the authentication information received in the reception step; and

the authentication step of making, when the instruction information indicates the authentication request, user authentication on the basis of the authentication information received in the reception step, and registration contents registered in the registration step.

53. (Currently Amended) An authentication certificate used to authenticate a given person, comprising:

a base; and

information being on said base in a retrievable form,

wherein the information ~~a holding portion for making said base hold~~
~~information that~~ represents a layout pattern of a hybridization pattern formed on a reacted DNA array obtained by reacting a DNA array in which a plurality of DNA probes corresponding to plural kinds of genes are arranged in a predetermined order, with a gene obtained from a ~~given~~ said person.

54. (Original) The certificate according to claim 53, wherein said holding portion holds the information that represents the layout pattern of the reaction probes by attaching the reacted DNA array.

55. (Original) The certificate according to claim 53, wherein said holding portion holds the information that represents the layout pattern of the hybridized probes by one of magnetic recording and digital recording.

56. (Original) The certificate according to claim 55, wherein the DNA array is formed by arranging a plurality of probes in row and column directions, and

the information that represents the layout pattern of the reaction probes contains position information which expresses positions of the hybridized probes on the DNA array by row and column addresses.

57. (Previously Presented) A computer readable medium which stores a control program for making a computer execute an authentication process for personal authentication using storage means for storing registration information which includes layout information that represents a hybridization pattern formed on a reacted DNA array obtained by reacting a DNA array in which a plurality of DNA probes corresponding to plural kinds of genes are arranged in a predetermined order, with a gene obtained from a given person, said control program comprising:

a code of the acquisition step of acquiring the layout information from an authentication certificate;

a code of the generation step of generating authentication information on the basis of the layout information acquired in the acquisition step; and

a code of the authentication step of making authentication by collating the authentication information generated in the generation step with the registration information stored in said storage means.

58. (Previously Presented) A computer readable program which stores a control program for making a computer execute an authentication process for making authentication using an authentication certificate attached with a hybridization pattern formed

on a reacted DNA array obtained by reacting a DNA array in which a plurality of DNA probes corresponding to plural kinds of genes are arranged in predetermined order, with a gene obtained from a given person, said control program comprising:

a code of the acquisition step of acquiring layout information that represents the layout pattern of the hybridized probes by reading the authentication certificate;

a code of the generation step of generating authentication information on the basis of the layout information acquired in the acquisition step;

a code of the registration request step of sending the authentication information to the external apparatus to request user registration; and

a code of the authentication request step of sending the authentication information to the external apparatus to request authentication.

59. (Previously Presented) A computer readable medium which stores a control program for making a computer execute an authentication process for making authentication on the basis of layout information that represents a hybridization pattern formed on a reacted DNA array obtained by reacting a DNA array in which a plurality of DNA probes corresponding to plural kinds of genes are arranged in a predetermined order, with a gene obtained from a given person, said control program comprising:

a code of the input step of inputting authentication information containing the layout information, and instruction information indicating a registration request or authentication request;

a code of the registration step of making, when the instruction information indicates the registration request, user registration on the basis of the authentication information received in the reception step; and

a code of the authentication step of making, when the instruction information indicates the authentication request, user authentication on the basis of the authentication information received in the reception step, and registration contents registered in the registration step.

60. (Previously Presented) A system for issuing an authentication certificate used in personal authentication, comprising:

reaction means for reacting a DNA array with a gene obtained from a given person, the DNA array being selected from plural kinds of DNA arrays each of which has a plurality of DNA probes corresponding to plural kinds of genes arranged in a predetermined order, wherein the order of the DNA probes in the plural kinds of DNA arrays are different from each other;

registering means for registering an order of DNA probes of the selected DNA array;

issuing means for issuing an authentication certificate for certifying the person by using a hybridization pattern formed on a reacted DNA array obtained by said reaction means; and

deleting means for deleting said hybridization pattern after issuing the authentication certificate.

61. (New) An authentication method comprising the steps of:

(i) reacting a DNA array with a gene obtained from a given person to form a first hybridization pattern, the DNA array being selected from plural kinds of DNA arrays each of which has a plurality of DNA probes corresponding to plural kinds of genes arranged in a predetermined order, wherein the order of the DNA probes in the plural kinds of DNA arrays are different from each other;

(ii) registering information regarding the order of the DNA probes of the DNA array selected in the step (i);

(iii) issuing an authentication certificate carrying a hybridization pattern formed on a reacted DNA array obtained by the step (i) to the given person;

(iv) forming a second hybridization pattern, when a person holding the authentication certificate issued in the step (iii), needs to be identified as a true holder of the authentication certificate, the step (iv) comprising the sub-steps of:

(iv-1) regenerating a new DNA array which is identical to the DNA array selected in the step (i) by using the information registered in the step (ii); and

(iv-2) reacting the new DNA array with a gene obtained from the suspected person to form a second hybridization pattern; and

(v) comparing the first hybridization pattern on the authentication certificate and the second hybridization pattern.